AVANTI CLIMB ASSISTANCE – TYPE VI

User's Manual and Installation Instructions

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EC-Declaration of Conformity for Machinery

Directive 2006/42/EC, Annex II, A

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herewith declares that the model of the following machinery

Type: **AVANTI Climbing Assistance OPS. VI**

- is in conformity with the provisions of the Machinery Directive 2006/42/EEC as amended at the time of the declaration
- is in conformity with the provisions of the following additional EC-directives as amended at the time of the declaration

Low-Voltage directive	2006/95/EC
Electromagnetic compatibility	2004/108/EC

- conform to the following standards:

EN ISO 12100-1:2005	Safety of machinery -- Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN ISO 12100-2:2005	Safety of machinery -- Basic concepts, general principles for design - Part 2: Technical principles
EN 60204-1: 2006	Safety for machinery; Electrical equipment of machinery; Part 1: General requirements;

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Limited Warranty

AVANTI Wind Systems A/S warrants that commencing from the date of shipment to the Customer, and continuing for a period of the longer of 365 days thereafter, or the period set forth in the standard AVANTI warranty, the AVANTI Climbing assistance (“Product”) described in this Manual will be free from defects in material and workmanship under normal use and service when installed and operated in accordance with the provisions of this Manual.

This warranty is made only to the original user of the Product. The sole and exclusive remedy and the entire liability of AVANTI under this limited warranty shall be, at the option of AVANTI, a replacement of the Product (including incidental and freight charges paid by the Customer) with a similar new or reconditioned Product of equivalent value, or a refund of the purchase price if the Product is returned to AVANTI, freight and insurance prepaid. The obligations of AVANTI are expressly conditioned upon return of the Product in strict accordance with the return procedures of AVANTI.

This warranty does not apply if the Product (i) has been altered without the authorization of AVANTI or its authorized representative; (ii) has not been installed, operated, repaired, or maintained in accordance with this Manual or other instructions from AVANTI; (iii) has been subjected to abuse, neglect, casualty, or negligence; (iv) has been furnished by AVANTI to the Customer without charge; or (v) has been sold on an “AS-IS” basis.

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In any cases of dispute the English original shall be taken as authoritative.

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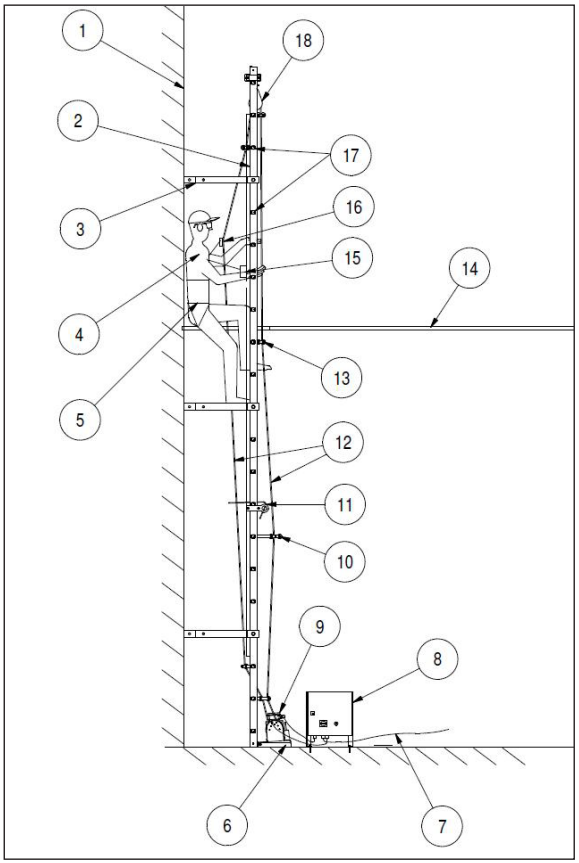
Introduction

Fig. 1: System outline



List of Signs:

1.Wall
2.Ladder
3.Ladder brackets
4.Person ascending
5.Harness
6.Spring-loaded base
7.Power supply
8.Electrical control box
9.Motor with drive wheel
10.Long guide roller
11.Resting platform
12.Hauling rope
13.Short guide roller
14.Platform
15.Fall arrest device
16.Rope Clamp with ReleaseStrap
17.Rungs
18.Top fitting with top pulley

1. System outline

CAUTION:

- The AVANTI Climbing Assistance installation and service may only be carried through by a competent person or an expert, authorized by Avanti.
- Once a competent person or an expert installs, services, or in any other way alters the Climbing Assistance system, he alone is responsible for doing so in accordance with these User's Manual and Installation Instructions.

DANGER:

- Do not keep or store the hauling rope in direct sunlight.
- Keep the hauling rope clean and free of oil, grease and chemicals.
- Only install an earth leakage circuit breaker that reacts to pulsing DC.

Installation Manual

AVANTI recommends the following installation procedure.

1. Install the motor underneath the ladder.
2. Install top fitting with pulley, then guide rollers and hauling rope.

1. Motor installation:

1. Position the motor base with motor and drive wheel close to the ladder, on the opposite side of the fall protection rail (see fig. 2). In case the fall protection rail is positioned at the center of the ladder, align the motor base as shown in fig. 3. This will leave the hauling rope approximately 30 mm off the fall protection rail to the right side (fig 3). The motor can be also aligned 30 mm off the left side of the fall protection rail if necessary. Once the motor is aligned, fasten it to the tower platform using the 4 bolts supplied. Start with the closest bolt to the center of the ladder (the closest to the fall protection rail). If the motor is fixed to a concrete basement, use wall anchors for mounting.

2. Position the electrical control box close to the ladder. Fix the electrical control box to the platform using the angle fittings supplied (see fig. 4).

Fig. 2 Motor

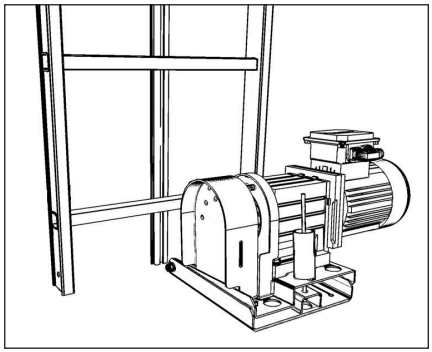


Fig. 3 Motor position

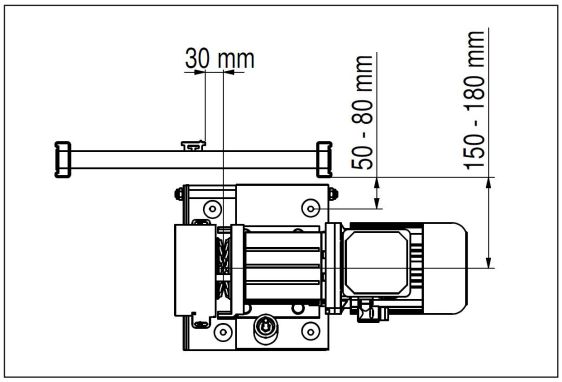
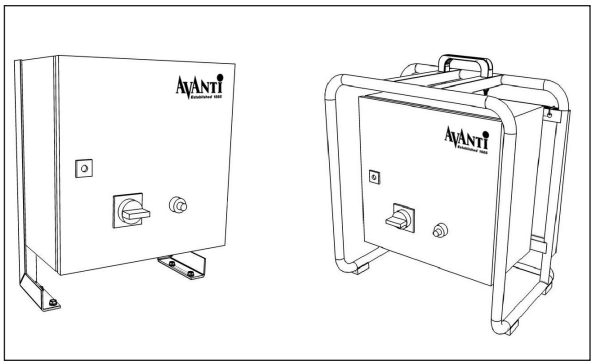
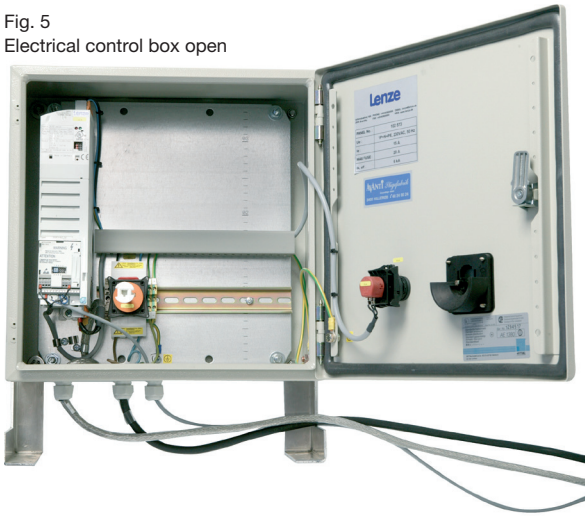


Fig. 4 Fixed and portable electrical control box



2. Electrical installation

Fig. 5
Electrical control box open



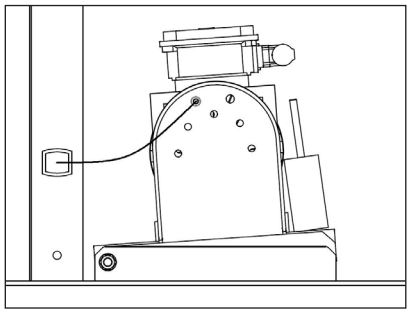
2.1 Sensor installation

WARNING: *adjust sensor while the system is unplugged.*

Proceed to adjust the sensor leaving a distance of 0,5-1,5 mm between the drive wheel and the sensor.

After mounting the hauling rope, the sensor may need adjustment.

Fig. 6 Sensor and sensor cable



2.2 Sensor test

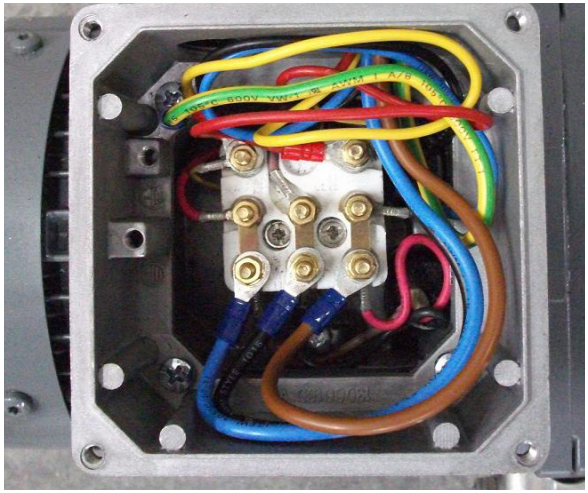
After installing the hauling rope turn on the power supply. Then, a diode on the sensor cable will light permanently. Pull down the rope. The sensor should register the movement of the drive wheel and another diode will start flashing on the sensor cable. The motor will start. If the movement is not detected, adjust the sensor position on the drive wheel according to the sensor installation.
Ensure the jam nuts are tightened to hold the sensor in position.

2.3 Motor cable installation

In case the connection of the motor was hardwired, connect the control box to the motor according to the wiring diagram supplied inside the control box:

- Conductor 1 to U
- Conductor 2 to V
- Conductor 3 to W
- Green-yellow conductor to earth connection
- Conductors 4 and 5 to the motor thermal switch (the order of connection is not important)

Fig. 7 Motor connection
The motor is connected in delta connection.



2.4 Power cable installation

When the climbing assistant is fully installed, connect the electrical control box to the 230 V, 50-60 Hz (1 phase + N + earth) power supply according to the wiring diagram supplied inside the control box.

Make sure the power supply is protected with:

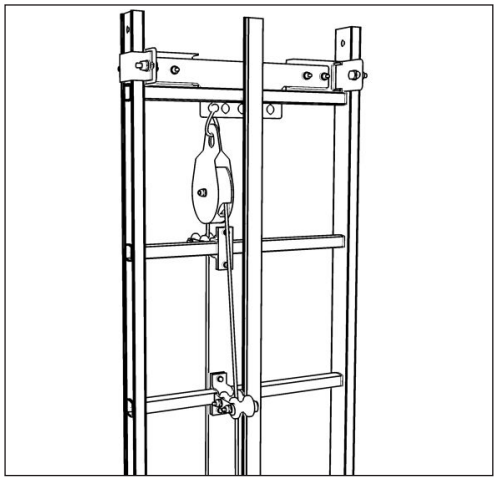
- Circuit breaker MCB 16 Amps Type C.
- Residual current device RCD 30mA superimmunized.

3. Rope mounting

3.1 Rope installation

1. Get up to the ladder top, taking up the top fitting, top pulley, bolts, and one end of the hauling rope. It is easier to bring the rope up the front side of the ladder and feed it down the rear.

Fig. 8

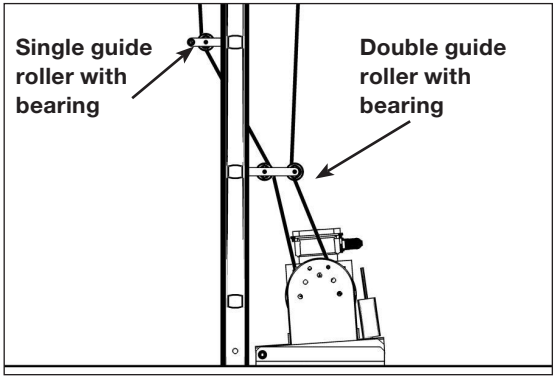


2. At the top of the ladder, mount the top fitting as shown in fig. 8. The top pulley is positioned just off the rail center using the holes in the top fitting so that it matches the bottom drive wheel position. Assemble two short guide rollers on the rungs just below the top pulley to make sure the right guiding of the rope.

3. Pass the rope through the top pulley and feed it down the rear of the ladder while descending.

4. Assemble a double guide roller with bearing on the first rung over the motor and a single guide roller with bearing on the second rung over the motor (see Fig. 9).

Fig. 9



5. At the base platform, pass the rope between the guide rollers with bearing and the drive wheel. Tighten the rope slightly and fasten – do not splice it yet.

6. Mount the remaining rope guide rollers on the rear side of the ladder. Make sure the brackets are mounted with bolt heads facing away from the climber (fig. 10). This will avoid rope from rubbing on the bolt heads and causing damage to the rope (fig. 11). The guide roller's function is to prevent the rope from rubbing on the tower and resting platforms. Use a short guide roller at every tower platform and a long guide roller at the resting platforms. There are available protected guide rollers to prevent trapping (Fig. 12).

CAUTION:

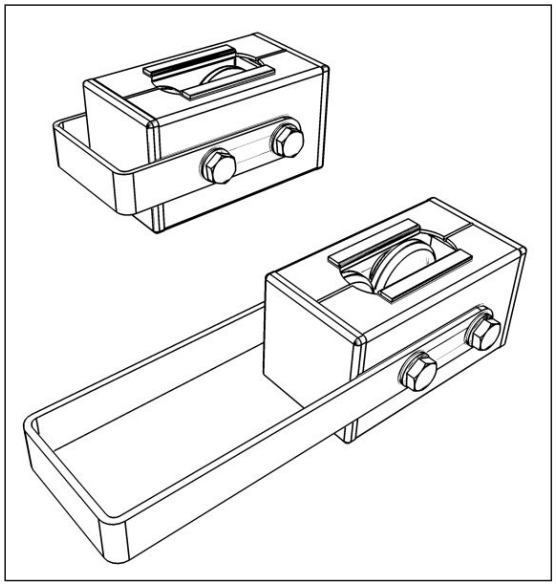
• *Mount the guide rollers so as not to interfere with any element of the tower (for example the power cables and other internal parts).*

7. Streching of the rope:
After having mounted all the guide rollers...
a) Loosen motor spring adjustment nuts and open the motor base plate as much as possible.

Fig. 10

Fig. 11

Fig. 12



b) Make sure the rope ends leave enough excess rope at each end to perform the splice (3.5 rungs of excess from the bottom rope grab and 7 rungs of excess from the top rope grab).

c) Using a rope tensioner and a dynamometer, tension the rope 110kg.

d) Then Pull the rope back and forth at arms length for 5 cycles. Tension will drop to around 95kg.

e) Tension the rope back up to 110kg. Pull the rope back and forth 5 cycles. Tension will drop to around 100kg.

f) Tension the rope back up to 110kg. Pull the rope back and forth 5 cycles. Tension will drop to around 105kg.

g) Tension the rope to 140kg and let it sit overnight (14hrs min). Tension will usually drop to between 95kg to 125kg.

h) Now tension the rope to 95kg (90kg for a used rope) to mark the rope ends for splicing.

8. Cut off the excess rope, leaving an overlap of 50 cm. These 50 cm are needed for the splicing.

9. Splice the rope as described in section 3.2.

10. Tighten the spring on the motor base. The final length of the spring must be 60 mm.

11. The tension after splice and the tension of the spring must be between 85-95 kg for climb assist to operate properly.

12. After mounting the hauling rope, test the sensor as described in section 2.2.

Fig. 13

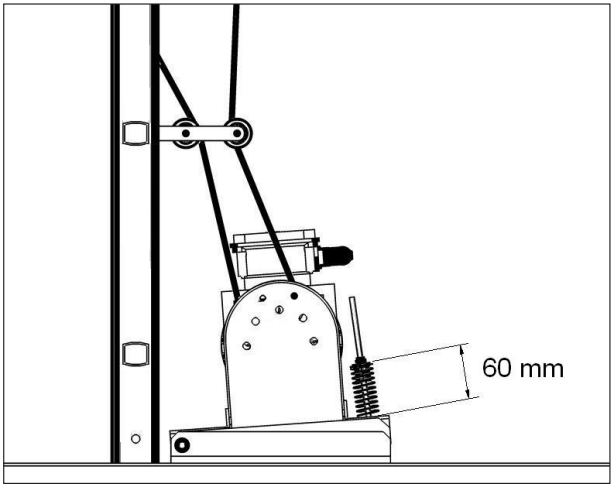
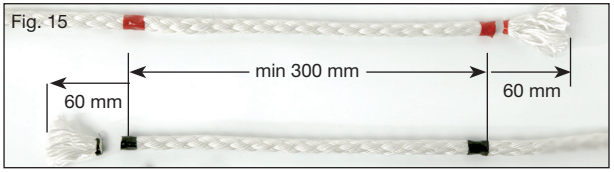


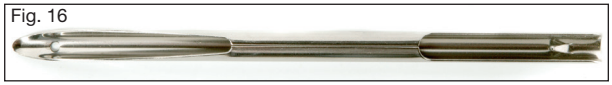
Fig. 14

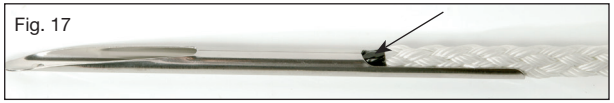
3.2 Splicing the hauling rope

1. For the rope splicing use the supplied splicing needle.
2. Make sure the rope is properly stretched.
3. Increase the tension of the rope to 140 kg.
4. For clarifying the splicing process one rope-end will be marked with red tape and the other one with black tape.
5. From the end of the rope measure 60mm and then seal with red tape and cut off the strands. On the same rope from place another red tape mark at 300 mm from the previous red tape.
6. The other rope-end should be sealed and marked with black tape using the same method.

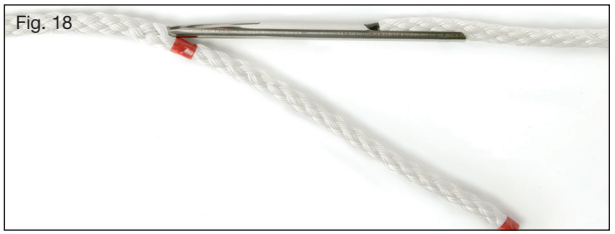


7. Insert the black rope-end into the Ø10mm splicing needle. Make sure the rope-end is firmly placed inside the needle and is securely in the needle slot.

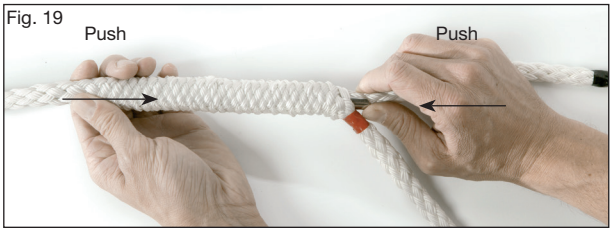




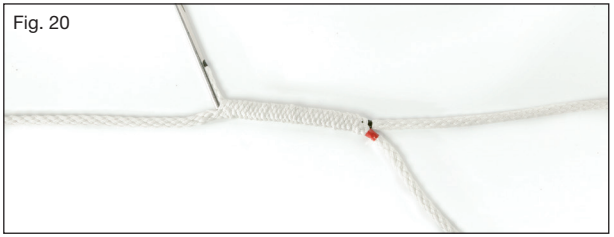
8. Insert the splicing needle into the red rope just after the mark.



9. Feed the full length of the splicing needle through the red rope.

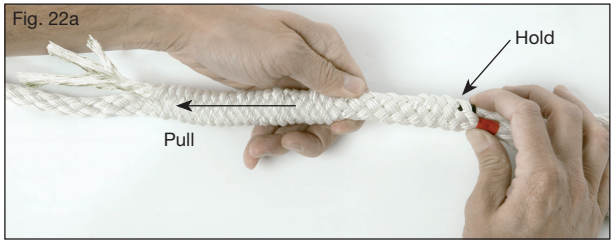


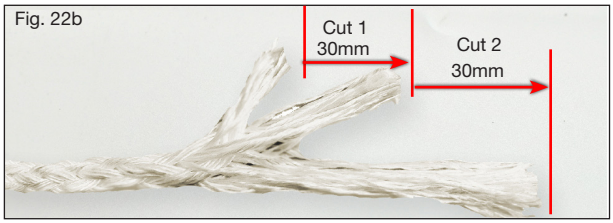
10. Take the splicing needle out of the red rope.



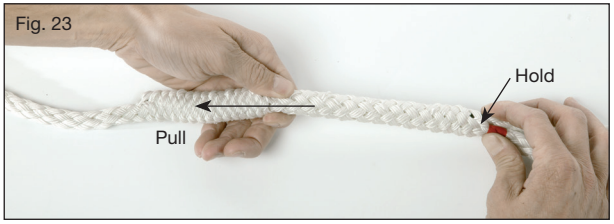
11. Remove the splicing needle. Pull the black rope through the red rope until the black mark passes the red mark.

12. Take off the black tape used to seal the rope at the end. We must open the strands of the end, take them in three groups and cut them at different lengths (3cm between cuts). In this way, we get a softer transition between the diameter of the splicing and the diameter of the rope.

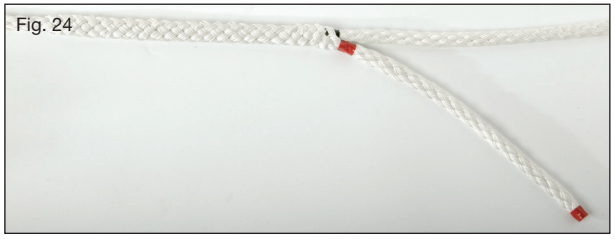




13. With your right hand hold together the red and black rope marks. Use your left hand for sliding the red rope over the black rope.

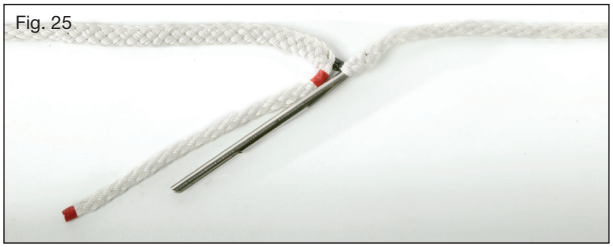


14. The rope-end should be hidden.



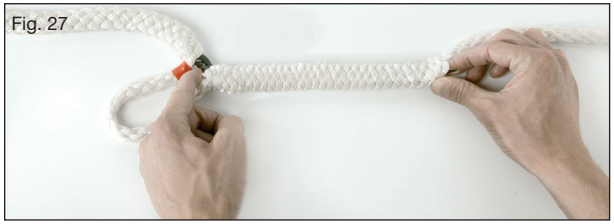
15. Now feed the red rope-end into the black rope as follows.

16. Insert splicing needle into black rope as close to the black rope mark as possible.



17. Fasten the red rope-end into splicing needle.

18. Feed the splicing needle through the black rope along the full length of the splicing needle.



19. Take the splicing needle out of the black rope.

Fig. 28

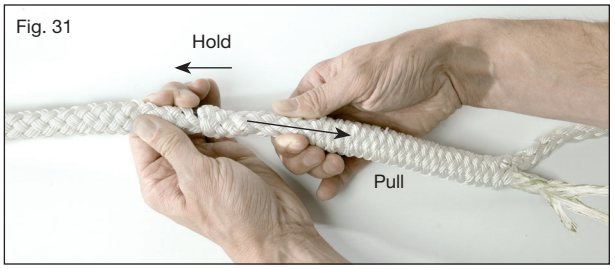
20.Pull the red rope as far as possible .

Fig. 29

Fig. 30

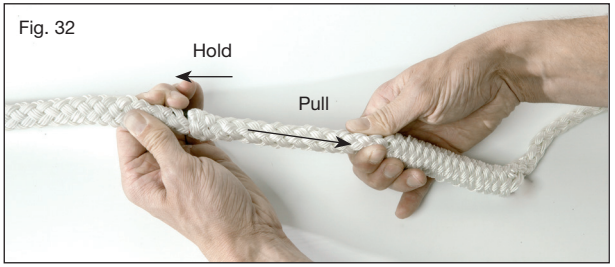
21. Take off the red tape used to seal the rope at the end. We must open the strands of the end, take them in three groups and cut them at different lengths (3cm between cuts).

Fig. 31



22. Hold the splice point with your left hand and then pull the black rope back over the end of the rope so that the rope end gets hidden.

Fig. 32



23. Finally stretch the rope by pulling the outer rope from the splice point towards the ends. This assures a snug splice join.

Fig. 33

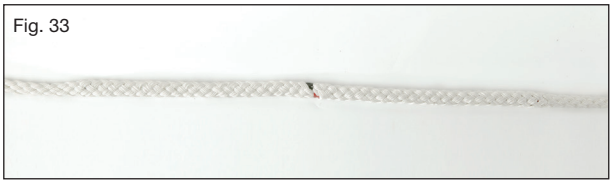
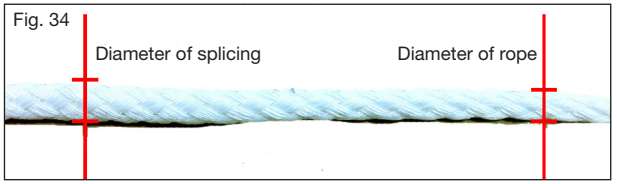


Fig. 34



4. Dismantling

Remove the rope, followed by the guide rollers, top pulley, motor, and electrical control box. Dispose according to municipal regulations.

5. Marking

Fig. 34
Product marking

Fig. 35
Quick guide

AVANTI Climbing assistance
AVANTI Sistema de ayuda a la ascensión
STOP
• User must be at least 18 years old.
• User must have a bodyweight of minimum 95 kg/120 Lb
• Use only original AVANTI rope clamp.
• Always use fall protection equipment (P.P.E.).
• Do not use the device more than one person at the same time
The Climbing Assistance does not replace fall protection equipment (P.P.E.).
Instructions:
1. Check rope tension spring on motor base. If spring length is more than 60 mm, the rope needs tensioning. See manual for tensioning method.
2. Check if green light on motor wheel casing is on. If not: connect to the power supply and/or turn on the red switch on the grey control box.
3. Adjust pull force on grey control box (1 to 10).
4. Connect Personal Protective Equipment (P.P.E.) as prescribed by manufacturer.
5. Fasten rope clamp carabiner on harness.
6. Fasten rope clamp on climbing assistance rope.
7. Pull climbing assistance rope to activate motor.
8. STOP – stand still for 5 seconds.
9. After use, turn off the power supply.
• El usuario debe tener al menos 18 años
• El dispositivo no puede ser utilizado por personas con un peso inferior a 55 Kg./120 lbs
• Sólo se puede utilizar conjuntamente con un sistema anti-caída.
• El dispositivo no se puede usar por más de una persona simultáneamente
El dispositivo de ayuda a la ascensión no sustituye al sistema anti-caída (línea de vida).
Instrucciones:
1. Controlar el muelle tensor del cable en la base del motor. Si la longitud es superior a 60 mm, tensar el cable. Consultar en el manual las instrucciones para tensar el cable.
2. Comprobar si la luz verde en la rueda motor está encendida. En caso contrario: conectar el dispositivo a la red y/o encenderlo desde el botón rojo de la caja de control
3. Ajustar la fuerza de arrastre (de 1 a 10) desde la caja de control.
4. Utilizar el sistema anti-caída según las instrucciones del fabricante.
5. Conectar el cáncamo al arnés.
6. Conectar el cáncamo en la cuerda de arrastre del sistema
7. Tirar de la cuerda para activar el motor
8. Detenerse 5 segundos.
9. Después del uso, desconectar la alimentación eléctrica.
4554-1073 Quickguide climb EN/ES
AVANTI

6. Technical specifications

Power supply: Standard: 230V, 50-60 Hz AC (1 phase + N + earth)
Option: 110V, 60 Hz AC (1 phase + N + earth)

Electrical protection:
Circuit breaker MCB 16 Amps Type C.
Residual current device RCD 30mA superimmunized.

Maximum current:	3,2 A ± 10%
Rated Power:	0,75 KW

Rated current consumption: 2,1 A – 2,5 A ± 10%

Adjustable lifting capacity approx: 35 – 45 kg

Speed: 30 m/min without load, adjusts automatically to the climber speed.

Working temperature:	Standard: -10°C - +55°C Option: -25°C - +55°C
Weight:	Motor: 27 kg Control box: 12 kg
Hauling rope Ø12mm:	Approx. 75 g/m
Breaking load:	2700 da N
Gear oil:	0,7 liters Mobil SHC 629

Protection Rating:	IP Protection motor IP55 IP Protection control box IP66

7. Purpose

CAUTION:

- A competent person is a person who has fully **read and understood** these Climbing Assistance User's Manual and Installation Instructions.
- The AVANTI Climbing Assistance installation and service may only be carried out by a competent person or an expert.
- Once a competent person or an expert installs, services or in any other way alters the Climbing Assistance system, he alone is responsible for doing so in accordance with these User's Manual and Installation Instructions.

DANGER:

- Do not store the hauling rope in direct sunlight.
- Keep the hauling rope clean and free of oil, grease and chemicals.
- The power supply must not be equipped with an earth leakage circuit breaker that does not also react to pulsing DC as this will cause operational problems.

Intended use

The AVANTI Climbing Assistance is intended for helping personnel to ascend and descend fixed ladders, by relieving them from 35kg to 45 kg of its weight.

Not suitable for

- Not suitable for lifting tools or parts.
- Not suitable for people below the age of 18 or people below the weight of 55 kg.
- Not suitable for multiple users at the same time.
- Not to be fastened to body parts or cloth.

The Climbing Assistant is not a fall protection device. Always wear proper fall protection equipment (P.P.E.)
Use original parts. No warranty is provided against damage resulting from reconstruction or modification of equipment, or use of non-original parts.

Functionality

The system includes a motor, a continuous hauling rope, an electrical control box. Hook on to the hauling rope using the Rope Clamp and activate the motor by pulling the hauling rope. A sensor on the drive wheel then registers the movement and starts the motor. The hauling rope then pulls with the pre-adjusted force (e.g. 40 kg.) regardless of the pace and direction of climb. Stop the rope in the same position for 3 seconds, then the sensor will register that the motion has stopped, and the pulling force fades out.

8. Daily inspections

Check the rope tension spring on the motor base (see Fig. 36). If spring length is more than 60 mm, the rope needs tensioning. Compress the spring using a spanner. If this does not tighten the rope sufficiently, a rope shortening is needed. See Installation Manual section 3.2.
Assure the rope is aligned on the guide rollers and on the drive wheel (see Fig. 37). The rope can be placed on both right and left side.
If anything abnormal is observed, take climbing assistance out of use. Repair the problem before continue to use the system.

Fig. 36

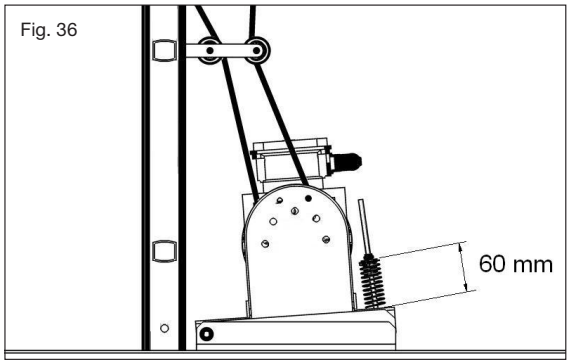
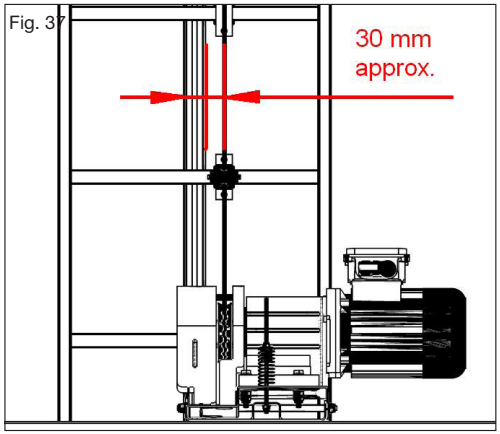


Fig. 37



CAUTION:

- With temperature under -20°C proceed as follows: Loosen the rope tension by means of the tension spring on the motor base. The length of the spring must be around 90mm. Turn on the control box and start the system without load. Let the system run for 5 minutes at least. This will allow the gearbox oil and the control box to increase the temperature for a proper performance. The stiffness of the rope will decrease as well. Turn off the control box and proceed to tighten the rope again, by means of the tension spring on the motor base. The final length of the spring must be 60mm.

9. Instructions for use

Before use, read these instructions.

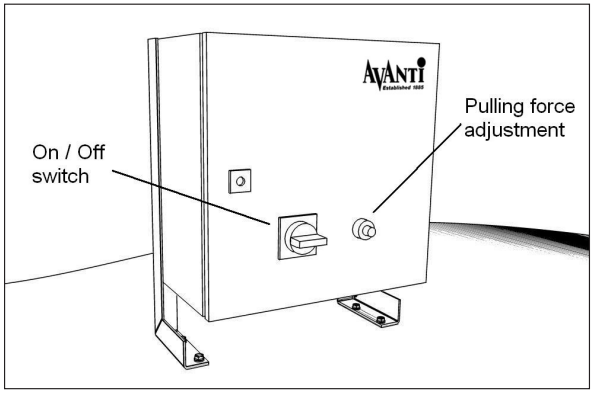
For use do as follows:

1. Perform the daily inspection described above.

2. Check if the LED diode on motor wheel guard lights. If not: connect to the power supply and/ or turn on the On / Off switch on the electrical control box.

3. Adjust the pulling force (1 to 10) on the electrical control box (Fig. 38). Depending on the rope length, it is equivalent to approximately 35kg - 45kg.

Fig. 38



4. Connect harness and fall protection device (P.P.E) as prescribed by manufacturer.

5. Fasten the Rope Clamp with the Release-Strap carabineer to the harness.

6. Fasten the Rope Clamp with Release-Strap on the climbing assistance rope (Fig. 39).
   It has to be anchored above the fall arrest attachment of the centered chest attachment of the fully body harness (Fig. 40).

Fig. 39 Rope Clamp with Release-Strap

7. Pull down the climbing assistance rope to activate motor. The rope will start pulling the climber up, relieving the weight previously set. The system will keep a continuous pulling force, following the climber's pace.

8. Keep still for 5 seconds to stop the system. The climber can now detach the Rope Clamp with Release-Strap from the rope.

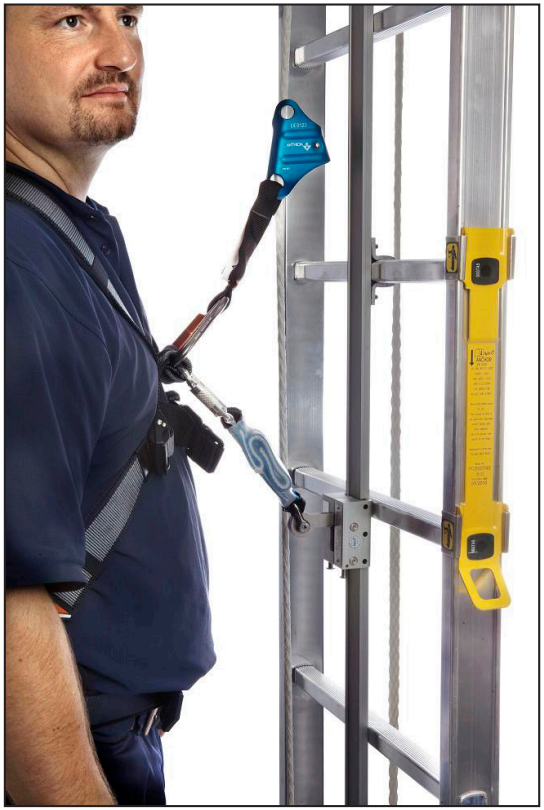
CAUTION: *Do not let the Release-Strap attached to the rope anytime.*

9. After use, turn off the power supply and unplug it from the power socket.

WARNING!
When using the climbing assistance keep your fingers and other body parts, clothes, etc. away from the hauling rope, drive wheel, guide rollers and pulley.

NOTE!
The main switch must not be connected/ disconnected several times in rapid succession. Doing so may damage the electrical installation.

Fig. 40



10. Maintenance

Perform daily inspection as prescribed above and take action if any abnormalities were found.

11. Yearly control

Once a year a competent person or an expert authorized by Avanti must inspect the climbing assistance. If not, this will void the warranty.

AVANTI runs “training classes” on regular basis. If interested, contact AVANTI.

CAUTION!
Before servicing the Climb Assistance System, unplug the power supply and wait for at least 1 minute.

Yearly control:

1. Assure all the bolts and nuts are tight (on motor, electrical control box, guide rollers, and top fitting).
2. Assure that the compression spring is compressed to L = 60mm (see Daily inspections section 8).
3. Gearbox oil: Change the gearbox oil every 3 years (see section 6, Technical Specifications). The date of last oil replacement is recorded in the Yearly Control Template, Appendix B.
4. Damaged parts should be replaced once they show signs of wear (on drive wheel, hauling rope, etc.). If only a section of the hauling rope needs replacement, insert a new section where it is damaged.

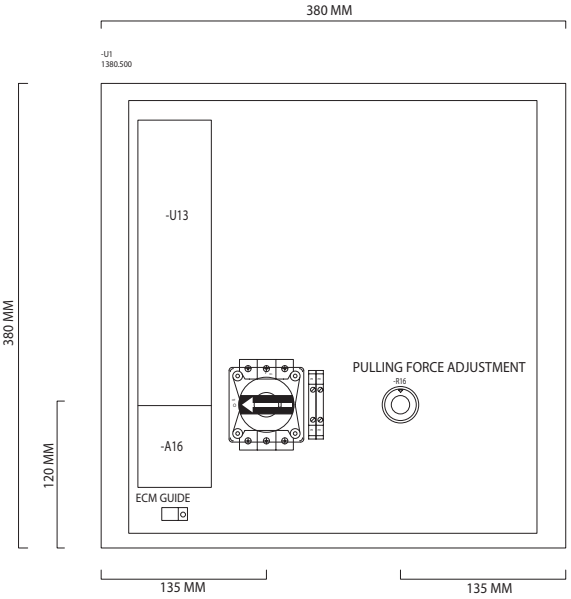
12. Trouble shooting

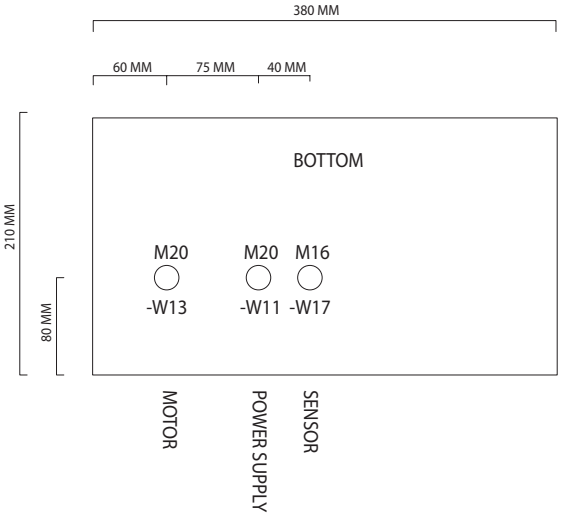
Breakdown: The system doesn’t start by pulling down the hauling rope.	
Cause:	**Solution:**
Power supply is off or unplugged.	Turn on the power supply. Plug the power supply to the power outlet.
The rope is stuck.	Find the blocking factor and remove it.
The sensor light is off.	Check the control box connections according to the wiring diagram. Check the sensor connection.
The sensor light color doesn’t change when the drive wheel turns. The sensor is not adjusted.	Adjust sensor as described in section 2.1 sensor installation.

Breakdown: Motor and drive wheel turn, however the hauling rope doesn’t move.	
Cause:	**Solution:**
The hauling rope is not properly tensioned and it slips around the drive wheel.	Check whether the spring is compressed to approximately 60 mm long. If not, adjust rope tension as specified in section 8 Daily inspections.
The hauling rope and/or the drive wheel is worn.	Replace the worn components.

Breakdown: The pulling force is too small	
Cause:	**Solution:**
The motor is not connected in delta / triangle connection	Check wiring at the motor connection box. Perform wiring according to delta / triangle connection.

Appendix A: Electrical control box overview





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